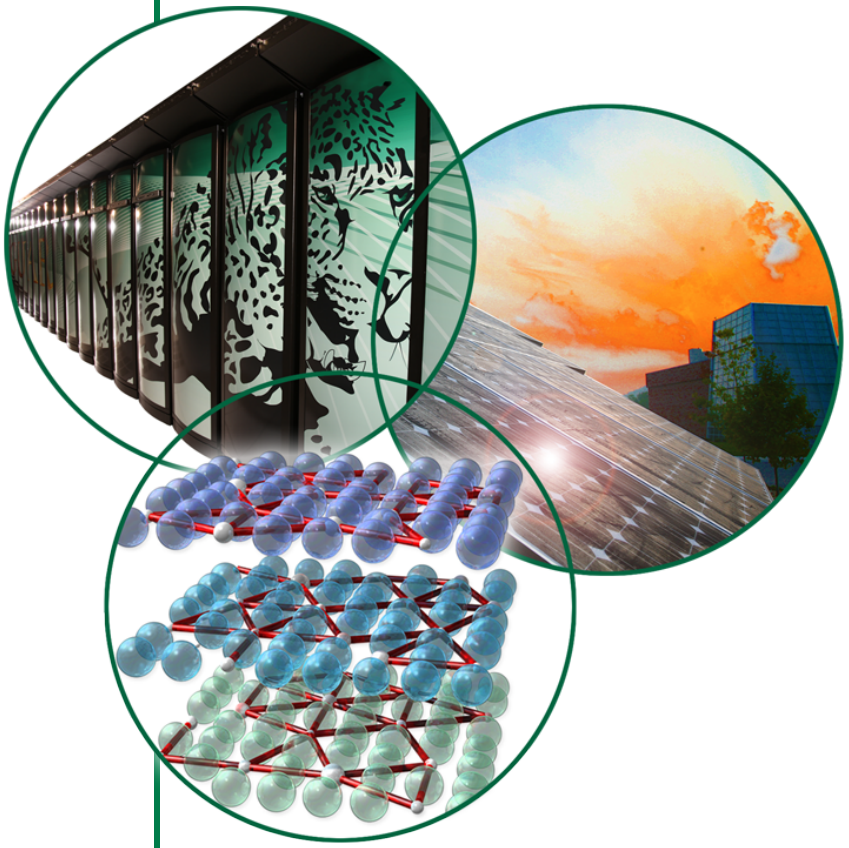
US DOE NCSP Criticality Safety Support Group (CSSG) Functions & Activities



Calvin M. Hopper

Chair CSSG

US DOE Technical Seminar
Oak Ridge National Laboratory
March 1, 2011

U.S. DEPARTMENT OF ENERGY

OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

CSSG*

- Mission
- Scope of Activities
- Membership
  - Current names
  - Expertise
- Activities
  - Historic overview
  - FY10 & FY11

*See U.S. Department of Energy Nuclear Criticality Safety Program website, http://ncsp.llnl.gov/cssgMain.html

Mission – Provide Operational & Technical Expertise to the NCSP Manager

- **Support DOE Missions**
  - **Stockpile Stewardship**
  - **Materials Stabilization**
  - **Transportation**
  - **Storage**
  - **Facilities Decommissioning**
  - **Waste Disposal**
- **Recommend Implementation & Execution of the Coherent & Efficient NNSA-administered NCSP***

***See** *http://ncsp.llnl.gov/NCSP-MV-COMPRESSED.pdf*

Scope of Activities

- Apart from participation in officially approved and funded CSSG meetings, expenditure of NCSP funds in support of activities shall be by formal *Tasking* from the NCSP Manager to the CSSG Chair
- Technical support to the NCSP manager in the execution of the NCSP including reviews for:
  - Activities or conditions that have the potential for serious degradation of nuclear criticality safety at DOE facilities
  - New nuclear facility designs where criticality accidents are a credible hazard
  - New or revised DOE Directives, Standards, and Guides related to criticality safety
  - Contractor nuclear criticality safety programs at DOE facilities in support of DOE Line Management
- Generally limited to addressing DOE complex-wide topics – not for one-of-a-kind site-specific problem solutions
- Meet face-to-face at least twice a year to review NCSP objectives & activities

CSSG Membership

Member	Affiliation	Ex-officio Member	Affiliation
Calvin M. Hopper, Chair	ORNL (ret.)	A. Nichole Ellis	SAIC/DOE-NA
E. Fitz Trumble, Dep. Chair	WSMS	James R. Felty	SAIC/DOE-NA
Richard E. Anderson	LANL	Ivon E. Fergus, Jr.	DOE-HS
David G. Erickson	SRS	Richard D. McKnight	ANL
Adolf S. Garcia	DOE-ID	Gladys O. Udenta	DOE-NA
David P. Heinrichs	LLNL	Lori Scott	SAIC/DOE-NA
Thomas P. McLaughlin	LANL (ret.)	Hazel Slemmons	SAIC/DOE-NA
James A. Morman	ANL		
Davis A. Reed	ORNL		
Robert E. Wilson	DOE-EM		

Emeritus Member	Affiliation
Jerry N. McKamy	DOE-NA
Thomas A. Reilly	WSMS (ret.)
Hans Toffer	Fluor Gov't Group
R. Michael Westfall	ORNL (ret.)

CSSG Member's Expertise

- Critical and Sub-Critical Integral Experiments
- Differential Nuclear Physics Measurements
- Nuclear Data Evaluation
- Computational Methods
- Criticality Safety Training and Qualification
- Management of Criticality Safety Programs
- Criticality Safety Evaluations
- Criticality Safety Consensus Standards

Historic Overview of CSSG 25 *Tasking* Activities Since January 2006

Tasking ID	Title
2006-01	Review of Criticality Safety Infractions & Deficiencies at Identified Priority Sites
2006-02	Recommendation on Internet Availability of Criticality Safety Related Reports
2006-03	Review and Recommendation on the LLNL Hands-On Criticality Safety Training Course Syllabus
2006-04	Review and Prioritization of Proposed NCSP Tasks for FY07
2006-05	Assessment of Criticality Safety and Nuclear Data Needs Requiring a Super-SHEBA Capability
2006-06	Assessment of Criticality Safety and Nuclear Data Needs Requiring Solution Critical Experiments Involving Other than Uranyl-Nitrate Solutions
2006-07	Technical review of the draft document, "Preclosure Criticality Analysis Process Report"
2007-01	Review and Prioritization of Proposed NCSP Tasks for FY08
2007-02	Review of Site Criticality Safety Infractions and Deficiencies Occurring in Calendar Year 2006
2007-03	Technical review of the document, "Preclosure Criticality Analysis Process Report, Rev.1 [dated – March 08, 2007]" and License Application Section 1.14 [Story Board Draft D] and Resolution of Previous CSSG Comments.
2007-04	Review of Fluor-Hanford Draft Criticality Safety Evaluation Report
2007-05	Review of RevCom Draft DOE-STD-1189

Historic Overview of CSSG 25 *Tasking* Activities Since January 2006 (cont.)

Tasking ID	Title
2007-06	CSSG Self-Assessment
2007-07	Review of the Technical Basis for IEZ at Y-12 (Y/DD-1242)
2008-01	OUO
2008-02	OUO
2008-03	Recommendation on the DOE needs for a large, multi-purpose horizontal split table critical assembly device
2008-04	Definition of critical in terms of calculated reactivity for use in probabilistic risk analysis
2008-05	OUO
2009-01	Position Paper on the Purpose, Structure and Operation of Criticality Safety Committees
2009-02	Development and Recommendation of a Uniform Criticality Incident Categorization Scheme
2009-03	Recommendations for the Future DOE NCSP Training and Education Infrastructure Program
2009-04	Review of the 2009 Revision to DOE-STD-1158, Self-Assessment Standard for DOE Contractor Criticality Safety Programs
2009-05	Development of a training guide for DOE-STD-1173-2009, Criticality Safety Functional Area Qualification Standard, DOE Nuclear Facilities Technical Personnel
2009-06	Review of the Technical Criticality Safety Basis for the Hanford Tank Farm

Four FY10 & FY11 Tasking Activities

- 2010-01, *Balanced Technical Approaches for Addressing Potential Seismically Induced Criticality Accidents in New Facility Design*
- 2010-02, *Role Of Criticality Safety In Facility Hazard Categorization*
- 2011-01, *Review of DOE O 420.1C*
- 2011-02, *Review Draft of DOE-STD-3009 Regarding Nuclear Criticality Safety Interaction with Documented Safety Analysis* (in progress)

2010-01, *Balanced Technical Approaches for Addressing Potential Seismically Induced Criticality Accidents in New Facility Design* – Response

- Generated from a thorough review of regulatory compliance issues
- Recommendations for
  - Application of a graded approach using sound practical judgment regarding risk and cost-benefit considerations
  - CSE participation in all stages of design processes to ensure
    - Proper facility hazard categorization based on radiological risks
    - Assignment of appropriate seismic design criteria and limit states for prevention of criticality accidents, likely SDC1 based upon CSSG Tasking 2010-02 Response

2010-01, *Balanced Technical Approaches for Addressing Potential Seismically Induced Criticality Accidents in New Facility Design* – Response

- Recommendations for (cont.)
  - CSE participation in all stages of design processes to ensure
    - Proper facility hazard categorization based on radiological risks
    - Assignment of appropriate seismic design criteria and limit states for prevention of criticality accidents, likely SDC1 based upon CSSG Tasking 2010-02 Response
    - Emergency plans and procedures associated with earthquakes can address personnel evacuation prior to the possible need for a criticality accident evacuation alarm system that is seismically tolerant

2010-02, *Role of Criticality Safety in Facility Hazard Categorization* – Response

- There is no technical justification for mandating a facility be categorized as HC 2 only because of the potential for a criticality accident (i.e., historic evidence and reasonably postulated criticality accident scenarios justify a hazard categorization no higher than HC 3 based upon the definitions of 10 CFR 830)
- Radiation exposures subsequent to the initiation of a criticality accident are minimized to the extent practicable with worker evacuation, radiation field measurements/relocations, and accountability during the period of the emergency response

2010-02, *Role of Criticality Safety in Facility Hazard Categorization* – Response (cont.)

- There are no safety gaps remaining after the application of DOE O 420.1B for criticality safety. Regardless of hazard categorization, DOE-STD-3009 requires that Chapter 3 of the DSA documents the evaluation of the facility and its hazards and provides a summary of the controls to ensure adequate protection. Chapter 6 of the DSA provides a summary of the facility criticality safety program. DOE O 420.1B points to DOE-STD-3007 and the ANSI/ANS-8 series of standards to ensure that the evaluation and selection of controls for criticality safety are performed without regard to the facility hazard categorization.

2010-02, *Role of Criticality Safety in Facility Hazard Categorization* – Response (cont.)

- Chapter 6 of the DSA should be included for HC 3 facilities so that the Safety Management Program (i.e., Criticality Safety Program) is defined according to the requirements of 10 CFR 830
- DOE O 4201.B and DOE-STD-1027 should be revised to more correctly address the role of the Criticality Safety Program for HC 3 and radiological facilities.

2011-01, *Review of DOE O 420.1C "Facility Safety"* – Response

- Red-line version of 420.1C returned to NCSP Manager with emphasis on criticality safety
- No confusing or ambiguous wording; however
  - Attachment 2 of 420.1C section 1.a appears inconsistent with the applicability statement in Attachment 2 Chapter I 2.b.
  - It is understood that section 1.a requirements would apply to "new facilities and major modifications" as other existing facilities may be covered by their code of record

2011-01, *Review of DOE O 420.1C "Facility Safety"* – Response (cont.)

- There are no new requirements in the draft version of 420.1C however requirement (Chapter III, 3.g) can be removed because it is specified in ANSI/ANS-8.3
- The removal of the 420.1B required link between 420.1C and DOE-STD-3007-2007 will need to be rectified
- Verbatim use of ANSI/ANS-8.XX standards will require either a page change to 3007-2007 to reflect the "should" statements in the standards or direct 420.1C requirements for replacing the "should" statements with "shall" statements

2011-01, *Review of DOE O 420.1C "Facility Safety"* – Response (cont.)

- To clarify the role of nuclear criticality safety outside of reactors it is recommended that
  1. ANSI/ANS-1 and ANSI/ANS-14.1 be added to the reference list in Section 7
  2. The following be added to section 2, Chapter III, Attachment 2:

     "With the exception of fuel handling and storage, the conduct of critical experiments is outside the scope of this order. Guidance for the conduct of critical experiments is provided in ANSI/ANS-1 and ANSI/ ANS-14.1"
  3. DOE O 5480.30 should be revised to address inclusion by reference to ANSI/ANS-1 and ANSI/ANS-14.1 then DOE O 420.1C, or successor, could point to 5480.30 regarding applicability to DOE O 420.1C Chapter III

2011-02, *Contribute To and Review the HSS Draft of DOE-STD-3009* – (in progress)

Emphasis on interaction of nuclear criticality safety with Documented Safety Analysis (DSA) expectations to include identification of

- **Any confusing, ambiguous or conflicting expectations to include suggested fixes**
- **Need for harmonization among other DOE orders, standards and guides**
- **Newly added or removed information/direction impacting CSPs**

Details about the CSSG and Taskings are at:

http://ncsp.llnl.gov/cssgMain.html

Questions?